PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2177772/VPA	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. PCT/AU2003/001133	International Filing Date *(day/month/year)* 3 September 2003	Priority Date *(day/month/year)* 3 September 2002

International Patent Classification (IPC) or national classification and IPC

Int. Cl. [7] A01N 35/02, 65/00

Applicant

BIOPROSPECT LIMITED et al

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of **15** sheet(s).

3. This report contains indications relating to the following items:

   - I [X] Basis of the report
   - II [ ] Priority
   - III [X] Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV [ ] Lack of unity of invention
   - V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI [ ] Certain documents cited
   - VII [ ] Certain defects in the international application
   - VIII [X] Certain observations on the international application

Date of submission of the demand 16 March 2004	Date of completion of the report 14 December 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer **ROSS OSBORNE** Telephone No. (02) 6283 2404

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/AU2003/001133

Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed.

☒ the description, pages **1-9, 11-13, 15, 17, 18, 20-32, 34-46** as originally filed,
pages , filed with the demand,
pages **10, 14, 16, 19, 33** received on **30 November 2004** with the letter of **30 November 2004**

☒ the claims, pages **47-65, 68, 70** as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages **66-67, 69, 71-77** received on **30 November 2004** with the letter of **30 November 2004**

☐ the drawings, pages , as originally filed,
pages , filed with the demand,
pages , received on with the letter of

☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

II. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be nonobvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos: **Claims 1-3, 7-8, 12, 16-28, 32-33, 37, 41-60, 64-65, 69, 73-81 (all partially)**

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for said claim Nos. **Claims 1-3, 7-8, 12, 16-28, 32-33, 37, 41-60, 64-65, 69, 73-81 (all partially)**

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Statement

Novelty (N)	Claims	**4-19, 21-25, 29-43, 49-57, 61-76**	**YES**
	Claims	**1-3, 20, 26-28, 44-48, 58-60, 77-81**	**NO**
Inventive step (IS)	Claims	**4-19, 21-25, 29-43, 49-57, 61-76**	**YES**
	Claims	**1-3, 20, 26-28, 44-48, 58-60, 77-81**	**NO**
Industrial applicability (IA)	Claims	**1-81**	**YES**
	Claims		**NO**

Citations and explanations (Rule 70.7)

D1 - WO 2002/050053

D2 - Palombo E. et al,..

D3 - Semple SJ et al,..

D4 - US 5917084

NOVELTY (N) Claims 1-3, 20, 26-28, 44-48, 58-60, 77-81

The closest prior art is D1. This citation broadly discloses compounds for pest control that fall within the scope of claims 1-3, 20, 26-28, 44-48, 58-60, 77-81 at least. D1 discloses the use of such compounds for pests including termites and spraying the pest or the infested site and coating or embedding the active compounds on various materials (see pages 39-46 and claims). D1 does not disclose any of the compounds described as actually being isolated in the current application but the present claims are directed at a far larger field.

D2 discloses Eremophila extracts that may contain compounds of the invention and are active against a number of species of gram positive bacteria. D3 has a similar disclosure but is directed at antiviral activity of such extracts. Because the amended application no longer claims pests that are microbes, D2 and D3 are no longer relevant to the claims.

D4 discloses eremophilone coated substrates for production of images but does not provide any basis for a prediction that the coated products would necessarily control pests. As the amended claims now require the coated products to be suitable for pest control this citation is no longer relevant.

INVENTIVE STEP (IS) Claims 1-3, 20, 26-28, 44-48, 58-60, 77-81

Claims 1-3, 20, 26-28, 44-48, 58-60 and 77-81 lack inventive step for reasons as given above

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The claims are not fully supported by the description. The description discloses the isolation from Eremophila and the identification and testing for anti-termite activity or termite deterrent activity of eremophilone and several eremophilone analogues. The eremophilone analogues that were assayed, contained a specifically located cyclic ketone functionality and an alkyl based group based of the type defined for R31 in claim 4. In the absence of any other information the compounds claimed should be limited to these compounds or analogues with only slight differences. The claims should thus be directed at eremophilone and a small number of analogues with the above structure and require the composition to have anti-termite/termite repellent activity.

Claim 58 and appended claims are also not supported by the description as these claims do not require the treated product to have termite repellent activity.

As used herein the terms "*pesticide*" or "*pesticidal*" refer to activity resulting in a high mortality rate in a pest population or activity that interferes with and/or disrupts normal growth, development and functioning of pests.

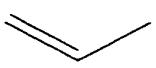
As used herein the terms "*termiticide*" or "*termiticidal*" refer to pesticidal activity resulting in a high mortality rate in a termite population or activity that interferes with and/or disrupts normal growth, development and functioning of termites.

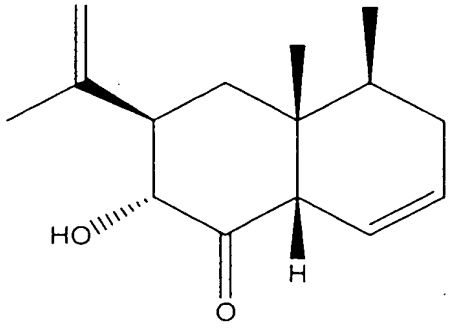
The term "*antifeedant*" as used herein refers to a compound that reduces the level of normal feeding by an organism.

The term "*repellent*" as used herein refers to a compound or substance that results in a change in direction of movement of an organism away from that compound or substance.

As used herein, the term "*pest*" is used in its broadest context and includes insects, arachnids, helminths and molluscs but excludes microbes.

The term "*wood associated pest*" refers to pests which bore into wood or timber and/or consume, damage or weaken wood, timber and/or wood or timber based products. Such pests include but are not limited to, termites, wood borer beetles, millipedes, isopods, weevils, moths and their larvae. For example, the larva of any one of numerous species of boring beetles, such as slaters, longicorn beetles, buprestidans, and certain weevils, the larva of any one of various species of lepidopterous insects, especially of the clearwing moths, the peach-tree borer and the goat moths, the larva of various species of hymenopterous insects of the tribe Urocerata, any one of several bivalve shells that bore into wood, such as the teredos, and species of Xylophaga and any one of several species of small Crustacea, such as the Limnoria, and the boring amphipod (*Chelura terebrans*).

Preferred compounds of formula (I) having pesticidal activity are those where Y is H and  represents  . Particularly preferred compounds of formula (I) or formula (II) having pesticidal activity are those represented by formula (III):



By way of example, compounds of formulae (I) and/or (III) encompassed by the present invention include, but are not restricted to, compounds having the following structural formulae:

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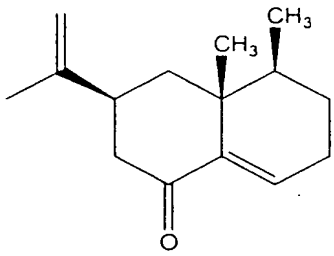
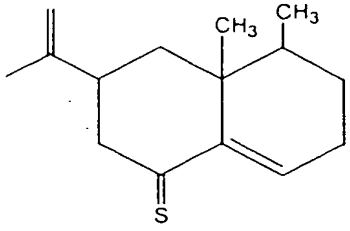
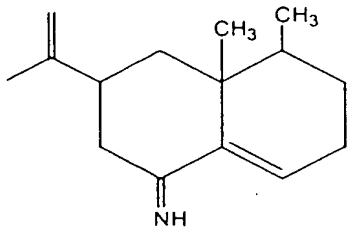
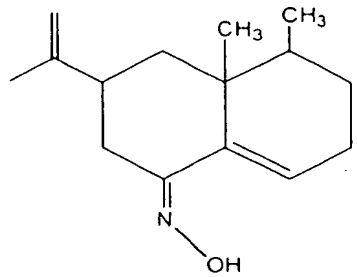
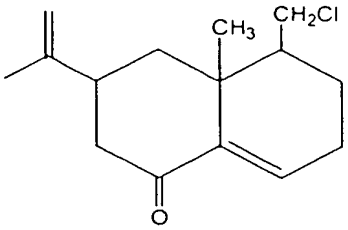


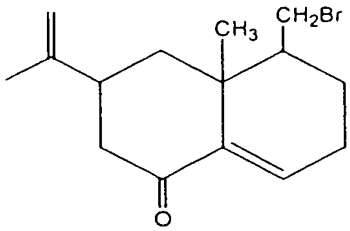
eremophilone

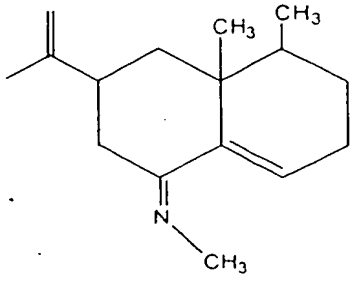


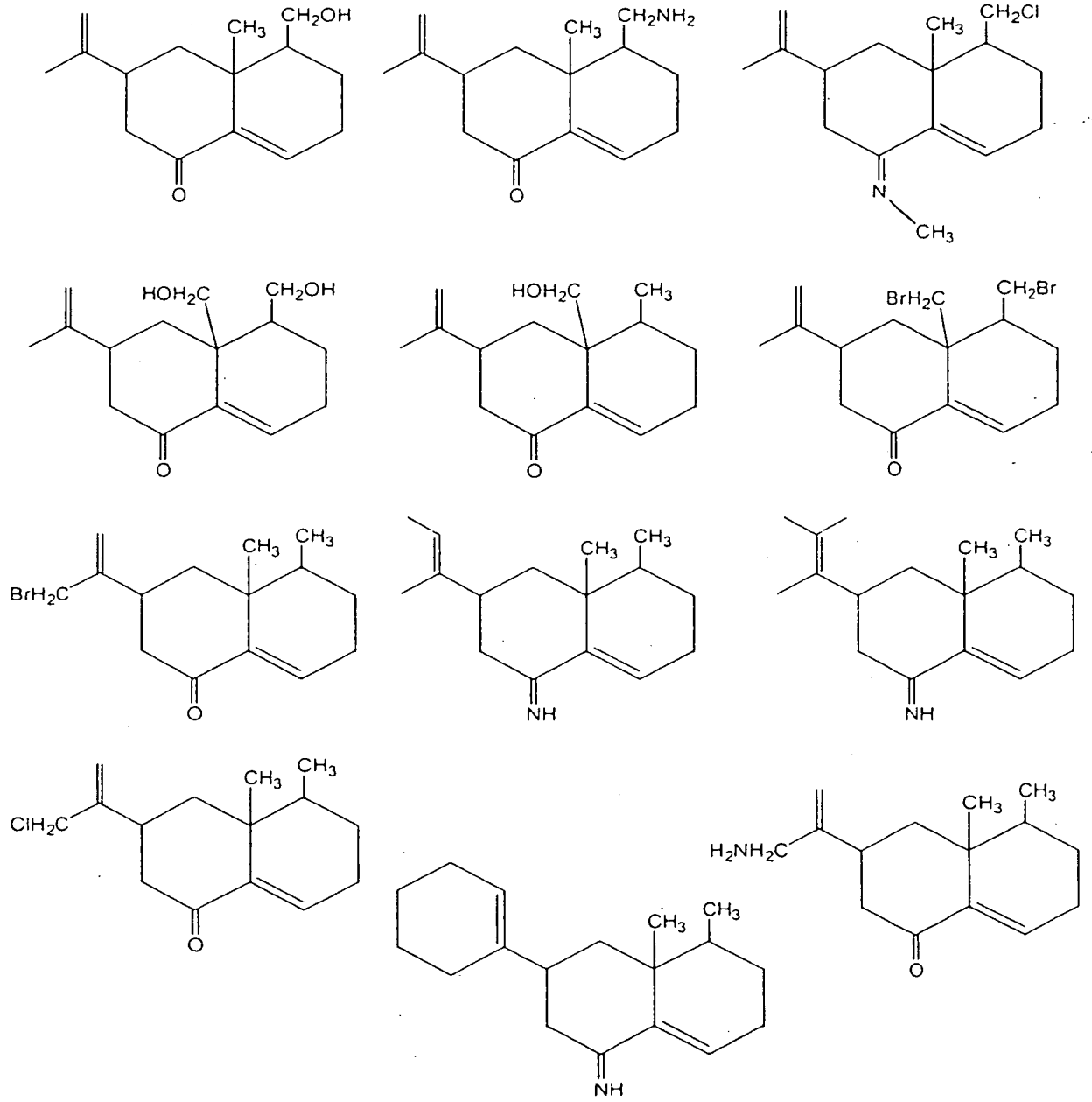




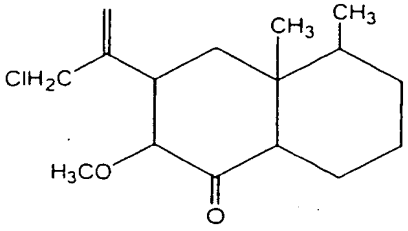


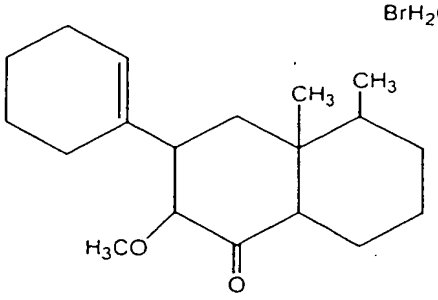


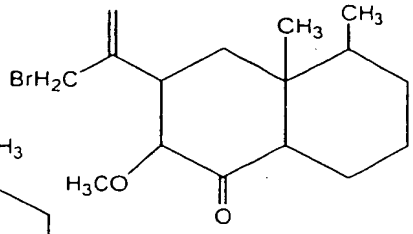




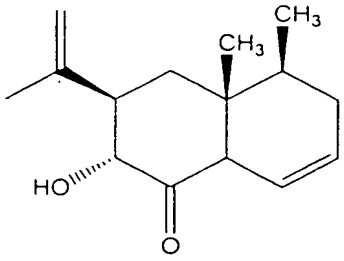
By way of example, compounds of formulae (I) and/or (IV) encompassed by the present invention include, but are not restricted to, compounds having the following structural formulae:

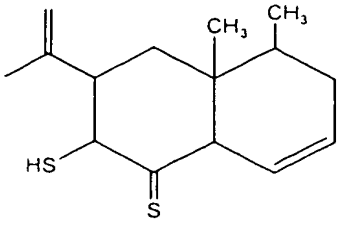


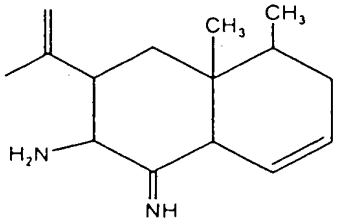


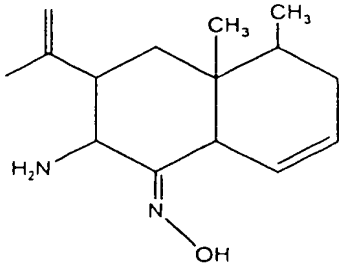


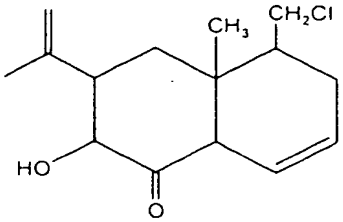
By way of example, compounds of formulae (I) and/or (V) encompassed by the present invention include, but are not restricted to, compounds having the following structural formulae:

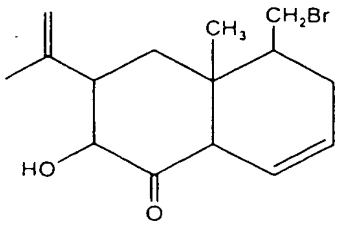


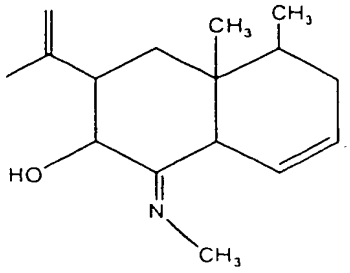












particle board or laminates. For such applications, the concentration of the compound of formula (I) in the composition should be sufficient to provide an effective amount of the compound in or on the timber.

Wood or timber may also be impregnated with the compounds of formula (I) using well known procedures such as, for example, pressure treatments such as the Lowery empty cell process and full cell process, vacuum treatment, hot and cold bath treatment, thermal treatment, and cold-soak treatment.

Furthermore the compounds of formula (I) and their compositions may be applied to pest shields and used in pest-proofing systems. Pest shields include metal shields incorporated during building of the structure to protect areas particularly susceptible to wood associated pest attack, such as window sills, wooden steps, porches and verandahs and lattice work. For example, suitable termite proofing systems include those described in US patent No. 6,397,518.

Certain compounds of formula (I) are novel and these form a further aspect of the present invention.

The terms "*comprise*", "*comprises*" and "*comprising*" and the like refer, unless the context requires otherwise, to the inclusion of a stated step or element or group of steps or elements but not the exclusion of any other step or element or group of steps or elements.

The compositions and methods of the present invention may be applied to pests including insects, arachnids, helminths and molluscs but excluding microbes. In one preferred embodiment, the pests are selected from wood associated pests. Examples of suitable insects that fall within the scope of the pests in the present invention include:

(a) the termites (Isoptera) which may be controlled with compounds of formula (I) and compositions containing compounds of formula (I) include subterranean termites, for example, *Calotermes flavicollis*, *Coptotermes spp* such as *Coptotermes acinaciforms*, *Leucotermes flavipes*, *Macrotermes subhyalinus*, *Nasutitermes spp* such as *Nasutitermes walkeri*, *Odontotermes formosanus*, *Reticulitermes lucifugus*, *Termes natalensis*, *Mastotermes spp.*,

41. A method according to claim 26 wherein the composition comprises an extract containing at least one compound of formula (I) obtained from a volatile oil bearing plant from the Myoporaceae family.

42. A method according to claim 41 wherein the extract is obtained from *Eremophila*, *Myoporum* and *Bonita* genera.

43. A method according to claim 42 wherein the extract is obtained from *E. alternifolia*, *E. duttonii*, *E. Freelingii*, *E. longifolia*, *E. cuneifolia*, *E. dalayana*, *E. abietina*, *E. caerulea*, *E. virgata*, *E. interstans*, *E. flaccida*, *E. leucophylla*, *E. metallicorum*, *E. georgei*, *E. subteritifolia*.

44. A method according to claim 26 wherein the pest-controlling effective amount is a pesticidally effective amount.

45. A method according to claim 26 wherein the pest-controlling effective amount is a pest-repelling effective amount.

46. A method according to claim 26 wherein the pest-controlling effective amount is a antifeedant effective amount.

47. A method according to claim 26 wherein the pests are selected from the group consisting of insects, arachnids, helminths and molluscs.

48. A method according to claim 26 wherein the pests are selected from the group consisting of termites, earwigs, cockroaches and wood borer beetles and their larvae.

49. A method according to claim 26 wherein the pests are wood associated pests.

50. A method according to claim 49 wherein the wood associated pests are selected from the group consisting of termites and wood borer beetles.

51. A method according to claim 50 wherein the wood associated pests are termites.

52. A method according to claim 26 wherein pests are exposed to the pest-controlling effective amount of a compound of formula (I) or a composition comprising at least one

compound of formula (I) by applying the compound or composition to a site of infestation, a potential site of infestation, a habitat of the pest or a potential habitat of the pest.

53. A method according to claim 52 wherein the compound or composition is applied to a surface or impregnated into a material or article of manufacture.

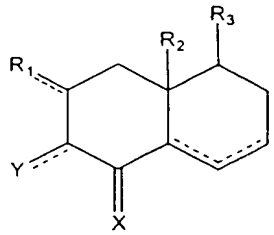
54. A method according to claim 53 wherein the compound or composition is applied to a surface by spraying, coating or painting the surface.

55. A method according to claim 54 wherein the surface is a soil surface, timber, buildings, wooden articles of manufacture or a physical barrier.

56. A method according to claim 55 wherein the material or article of manufacture is soil, timber, timber or wooden products or buildings or parts of buildings.

57. A method according to claim 52 wherein the compound or composition is applied in a band or furrow around a site of infestation or potential infestation or is mixed with a layer of soil at a site of infestation or a potential site of infestation.

58. A material or article of manufacture for use in pest control that is coated or impregnated with at least one compound of formula (I) or a tautomer thereof or with a composition containing at least one compound of formula (I) or a tautomer thereof:



(I)

wherein:

X is selected from the group consisting of O, S or N-R_4;

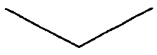
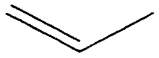
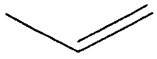
when ------ is a single bond attached to Y, Y is selected from the group consisting of H, $[C(R_7)_2]_n$halo, $[C(R_7)_2]_nOR_5$, $[C(R_7)_2]_nSR_5$, $[C(R_7)_2]_n(C=O)R_6$, $[C(R_7)_2]_n(C=S)R_6$, $[C(R_7)_2]_nN(R_4)_2$, $[C(R_7)_2]_n(C=NR_4)R_6$, $[C(R_7)_2]_nNO_2$ and $[C(R_7)_2]_nNR_4OR_8$;

cycloalkylthio, and C_3-C_{10} heterocyclylthio;

R_7 is selected from the group consisting of H, halogen, OR_5, SR_5, $N(R_4)_2$, $(C=O)R_6$, $(C=S)R_6$, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_3-C_{10} heterocyclyl, C_3-C_6 cycloalkyl, C_7-C_{12} arylalkyl, C_4-C_{12} heterocyclylalkyl, C_4-C_{10} cycloalkylalkyl, C_8-C_{13} arylalkenyl, C_5-C_{13} heterocyclylalkenyl, and NO_2;

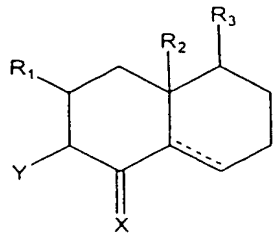
R_8 is selected from the group consisting of H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_8-C_{13} arylalkenyl, C_3-C_6 cycloalkyl, C_3-C_6 cycloalkenyl, C_4-C_{10} cycloalkylalkyl, C_5-C_{10} cycloalkylalkenyl, C_3-C_{10} heterocyclyl, C_4-C_{12} heteocyclylalkyl and C_5-C_{13} heterocyclylalkenyl;

n is 0 or an integer selected from 1 to 5;

 represents  ,  or  ; and

wherein each alkyl, alkenyl, alkynyl, cycloalkyl, cyclolkenyl, aryl and heterocyclyl group is optionally substituted.

59. A material or article of manufacture for use in pest control according to claim 58 wherein the compound of formula (I) is a compound of formula (II):



(II)

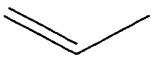
wherein:

X is selected from the group consisting of O, S or N-R_4;

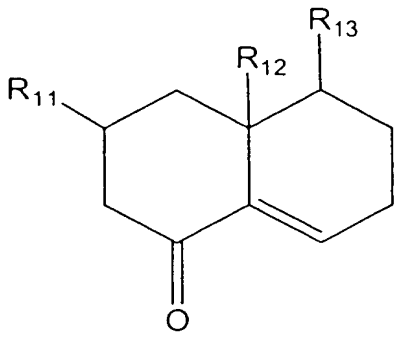
Y is selected from the group consisting of H, $[C(R_7)_2]_n$halo, $[C(R_7)_2]_nOR_5$, $[C(R_7)_2]_nSR_5$, $[C(R_7)_2]_n(C=O)R_6$, $[C(R_7)_2]_n(C=S)R_6$, $[C(R_7)_2]_nN(R_4)_2$, $[C(R_7)_2]_n(C=NR_4)R_6$, $[C(R_7)_2]_nNO_2$ and $[C(R_7)_2]_nNR_4OR_8$;

R_1, R_2 and R_3 are independently selected from the group consisting of H, OH, SH, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_8-C_{13} arylalkenyl, C_3-

wherein each alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl and heterocyclyl group is optionally substituted.

60. A material or article of manufacture for use in pest control according to claim 58, wherein  represents  in the compound of formula (I).

61. A material or article of manufacture for use in pest control according to claim 58, wherein at least one compound of formula (I) is a compound of formula (III):



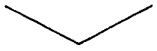
(III)

wherein R_{11} is selected from the group consisting of C_2-C_{10} alkenyl, C_7-C_{12} arylalkyl, C_6-C_{12} heteroarylalkyl and C_2-C_{10} alkenyloxy wherein each C_2-C_{10} alkenyl or C_2-C_{10} alkenyloxy is optionally substituted with 1 to 3 halo, hydroxy, thiol or nitro groups; and

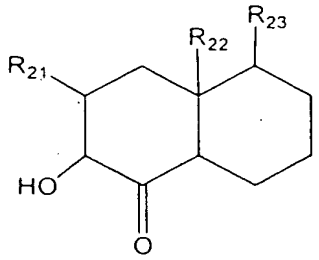
R_{12} and R_{13} are independently selected from the group consisting of H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_3-C_{10} cycloalkyl, C_5-C_{10} heteroaryl, C_6-C_{12} heteroarylalkyl and C_1-C_{10} alkoxy, wherein each C_1-C_{10} alkyl and C_1-C_{10} alkoxy is optionally substituted with 1 to 3 halo, hydroxy, thiol or nitro groups.

62. A material or article of manufacture for use in pest control according to claim 61, wherein R_{11} is C_2-C_{10} alkenyl optionally substituted with a hydroxy, nitro or thiol group or 1 to 3 halo groups, and R_{12} and R_{13} are independently selected from C_1-C_{10} alkyl optionally substituted with a hydroxy, nitro or thiol group or 1 to 3 halo groups.

63. A material or article of manufacture for use in pest control according to claim 58 wherein at least one compound of formula (I) is eremophilone.

64. A material or article of manufacture for use in pest control according to claim 58 wherein  represents  in the compound of formula (I).

65. A material or article of manufacture for use in pest control according to claim 58 wherein at least one compound of formula (I) is a compound of formula (IV):



(IV)

wherein R_{21}, R_{22} and R_{23} are independently selected from the group consisting of H, OH, SH, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_8-C_{13} arylalkenyl, C_3-C_6 cycloalkyl, C_3-C_6 cycloalkenyl, C_4-C_{10} cycloalkylalkyl, C_4-C_{10} cycloalkenylalkyl, C_3-C_{10} heterocyclyl, C_4-C_{12} heterocyclylalkyl, C_5-C_{13} heterocyclylalkenyl, C_1-C_{10} alkoxy, C_2-C_{10} alkenyloxy, C_1-C_{10} alkylthio, C_2-C_{10} alkenylthio, $[C(R_7)_2]_n$halo, $[C(R_7)_2]_n(C=O)R_6$, $[C(R_7)_2]_n(C=S)R_6$, $[C(R_7)_2]_nN(R_4)_2$, $[C(R_7)_2]_n(C=NR_4)R_6$, $[C(R_7)_2]_nNO_2$ and $[C(R_7)_2]_nNR_4OR_8$;

each R_4 is independently selected from the group consisting of H, OH, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_8-C_{13} arylalkenyl, C_3-C_6 cycloalkyl, C_3-C_6 cycloalkenyl, C_4-C_{10} cycloalkylalkyl, C_3-C_{10} heterocyclyl, C_4-C_{12} heterocyclylalkyl, C_5-C_{13} heterocyclylalkenyl, C_1-C_{10} alkoxy and C_2-C_{10} alkenyloxy;

R_6 is selected from the group consisting of H, OH, C_1-C_{10} alkoxy, C_1-C_{10} alkyl, C_2-C_{10}

alkenyloxy, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_6-C_{10} aryloxy, C_3-C_6 cycloalkyl, C_3-C_6 cycloalkenyl, C_3-C_6 cycloalkyloxy, C_3-C_6 cycloalkenyloxy, C_3-C_{10} heterocyclyl, C_3-C_{10} heterocyclyloxy, C_1-C_{10} alkylthio, C_1-C_{10} alkenylthio, C_6-C_{10} arylthio, C_3-C_6 cycloalkylthio, and C_3-C_{10} heterocyclylthio;

R_7 is selected from the group consisting of H, halogen, OR_5, SR_5, $N(R_4)_2$, $(C=O)R_6$, $(C=S)R_6$, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_3-C_{10} heterocyclyl, C_3-C_6 cycloalkyl, C_7-C_{12} arylalkyl, C_4-C_{12} heterocyclylalkyl, C_4-C_{10} cycloalkylalkyl, C_8-C_{13} arylalkenyl, C_5-C_{13} heterocyclylalkenyl, and NO_2;

R_8 is selected from the group consisting of H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_8-C_{13} arylalkenyl, C_3-C_6 cycloalkyl, C_3-C_6 cycloalkenyl, C_4-C_{10} cycloalkylalkyl, C_5-C_{10} cycloalkylalkenyl, C_3-C_{10} heterocyclyl, C_4-C_{12} heteocyclylalkyl and C_5-C_{13} heterocyclylalkenyl; and

n is 0 or an integer selected from 1 to 5;

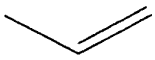
wherein each alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl and heterocyclyl group is optionally substituted.

66. A material or article of manufacture for use in pest control according to claim 65 wherein R_{21} is selected from the group consisting of C_2-C_{10} alkenyl, C_7-C_{12} arylalkyl, C_6-C_{12} heteroarylalkyl and C_2-C_{10} alkenyloxy wherein each C_2-C_{10} alkenyl or C_2-C_{10} alkenyloxy is optionally substituted with 1 to 3 halo, hydroxy, thiol or nitro groups; and

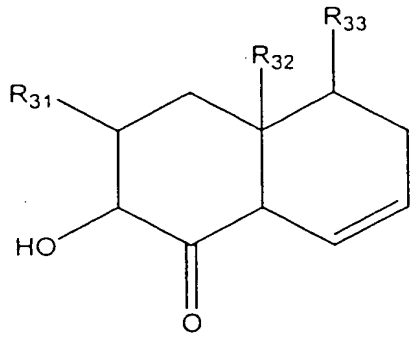
R_{22} and R_{23} are independently selected from the group consisting of H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_3-C_{10} cycloalkyl, C_5-C_{10} heteroaryl, C_6-C_{12} heteroarylalkyl and C_1-C_{10} alkoxy, wherein each C_1-C_{10} alkyl and C_1-C_{10} alkoxy is optionally substituted with 1 to 3 halo, hydroxy, thiol or nitro groups.

67. A material or article of manufacture for use in pest control according to claim 66 wherein R_{21} is C_2-C_{10} alkenyl, optionally substituted with a hydroxy, thiol or nitro group or 1 to 3 halo groups, and R_{22} and R_{23} are independently selected from C_1-C_{10} alkyl, optionally substituted with a hydroxy, thiol or nitro group or 1 to 3 halo groups.

68. A material or article of manufacture for use in pest control according to claim 58 wherein at least one compound of formula (I) is 8-hydroxy-1(10)dihydroeremophilone.

69. A material or article of manufacture for use in pest control according to claim 58 wherein  represents  .

70. A material or article of manufacture for use in pest control according to claim 58 comprising at least one compound of formula (V):



(V)

wherein R_{31} is selected from the group consisting of C_2-C_{10} alkenyl, C_7-C_{12} arylalkyl, C_6-C_{12} heteroarylalkyl and C_2-C_{10} alkenyloxy wherein each C_2-C_{10} alkenyl or C_2-C_{10} alkenyloxy is optionally substituted with 1 to 3 halo, hydroxy, thiol or nitro groups; and

R_{32} and R_{33} are independently selected from the group consisting of H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_3-C_{10} cycloalkyl, C_5-C_{10} heteroaryl, C_6-C_{12} heteroarylalkyl and C_1-C_{10} alkoxy, wherein each C_1-C_{10} alkyl and C_1-C_{10} alkoxy is optionally substituted with 1 to 3 halo, hydroxy, thiol or nitro groups.

71. A material or article of manufacture for use in pest control according to claim 70 wherein R_{31} is C_2-C_{10} alkenyl optionally substituted with a hydroxy, nitro or thiol group or 1 to 3 halo groups, and R_{32} and R_{33} are independently selected from C_1-C_{10} alkyl optionally substituted with a hydroxy, nitro or thiol group or 1 to 3 halo groups.

72. A material or article of manufacture for use in pest control according to claim 58 wherein at least one compound of formula (I) is 8-hydroxyeremophila-1,11-dienone.

73. A material or article of manufacture for use in pest control according to claim 58 wherein the composition comprises an extract containing at least one compound of formula (I) obtained from a volatile oil bearing plant from the Myoporaceae family.

74. A material or article of manufacture for use in pest control according to claim 73 wherein the extract is obtained from *Eremophila*, *Myoporum* and *Bonita* genera.

75. A material or article of manufacture for use in pest control according to claim 74 wherein the extract is obtained from *E. alternifolia*, *E. duttonii*, *E. Freelingii*, *E. longifolia*, *E. cuneifolia*, *E. dalayana*, *E. abietina*, *E. caerulea*, *E. virgata*, *E. interstans*, *E. flaccida*, *E. leucophylla*, *E. metallicorum*, *E. georgei*, *E. subteritifolia*.

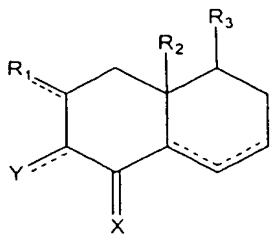
76. A material or article of manufacture for use in pest control according to claim 58 which is selected from the group consisting of a pest shield, pest barrier, soil or a timber product.

77. A pest control coating comprising a composition according to claim 1.

78. A pest control coating comprising a composition according to claim 20.

79. A method of combating an already existing wood associated pest infestation comprising applying a composition according to claim 1 or claim 20 or a coating of claim 77 or claim 78 to wood associated pest affected surface.

80. Use of at least one compound of formula (I) or a tautomer thereof in the manufacture of a composition for controlling pests:



(I)

wherein:

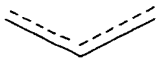
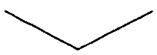
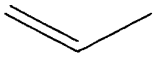
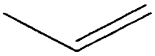
X is selected from the group consisting of O, S or N-R_4;

when ------ is a single bond attached to Y, Y is selected from the group consisting of H, $[C(R_7)_2]_n$halo, $[C(R_7)_2]_nOR_5$, $[C(R_7)_2]_nSR_5$, $[C(R_7)_2]_n(C=O)R_6$, $[C(R_7)_2]_n(C=S)R_6$, $[C(R_7)_2]_nN(R_4)_2$, $[C(R_7)_2]_n(C=NR_4)R_6$, $[C(R_7)_2]_nNO_2$ and $[C(R_7)_2]_nNR_4OR_8$; cycloalkylthio, and C_3-C_{10} heterocyclylthio;

R_7 is selected from the group consisting of H, halogen, OR_5, SR_5, $N(R_4)_2$, $(C=O)R_6$, $(C=S)R_6$, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_3-C_{10} heterocyclyl, C_3-C_6 cycloalkyl, C_7-C_{12} arylalkyl, C_4-C_{12} heterocyclylalkyl, C_4-C_{10} cycloalkylalkyl, C_8-C_{13} arylalkenyl, C_5-C_{13} heterocyclylalkenyl, and NO_2;

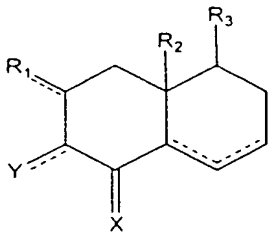
R_8 is selected from the group consisting of H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_8-C_{13} arylalkenyl, C_3-C_6 cycloalkyl, C_3-C_6 cycloalkenyl, C_4-C_{10} cycloalkylalkyl, C_5-C_{10} cycloalkylalkenyl, C_3-C_{10} heterocyclyl, C_4-C_{12} heteocyclylalkyl and C_5-C_{13} heterocyclylalkenyl;

n is 0 or an integer selected from 1 to 5;

 represents  ,  or  ; and

wherein each alkyl, alkenyl, alkynyl, cycloalkyl, cyclolkenyl, aryl and heterocyclyl group is optionally substituted.

81. Use of at least one compound of formula (I) or a composition containing at least one compound of formula (I) in the manufacture of an article or material for controlling pests:



(I)

wherein:

X is selected from the group consisting of O, S or N-R_4;

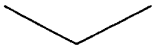
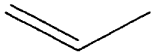
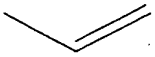
when ------ is a single bond attached to Y, Y is selected from the group consisting of H, $[C(R_7)_2]_n$halo, $[C(R_7)_2]_nOR_5$, $[C(R_7)_2]_nSR_5$, $[C(R_7)_2]_n(C=O)R_6$, $[C(R_7)_2]_n(C=S)R_6$,

$[C(R_7)_2]_nN(R_4)_2$, $[C(R_7)_2]_n(C=NR_4)R_6$, $[C(R_7)_2]_nNO_2$ and $[C(R_7)_2]_nNR_4OR_8$; cycloalkylthio, and C_3-C_{10} heterocyclylthio;

R_7 is selected from the group consisting of H, halogen, OR_5, SR_5, $N(R_4)_2$, $(C=O)R_6$, $(C=S)R_6$, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_3-C_{10} heterocyclyl, C_3-C_6 cycloalkyl, C_7-C_{12} arylalkyl, C_4-C_{12} heterocyclylalkyl, C_4-C_{10} cycloalkylalkyl, C_8-C_{13} arylalkenyl, C_5-C_{13} heterocyclylalkenyl, and NO_2;

R_8 is selected from the group consisting of H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_6-C_{10} aryl, C_7-C_{12} arylalkyl, C_8-C_{13} arylalkenyl, C_3-C_6 cycloalkyl, C_3-C_6 cycloalkenyl, C_4-C_{10} cycloalkylalkyl, C_5-C_{10} cycloalkylalkenyl, C_3-C_{10} heterocyclyl, C_4-C_{12} heteocyclylalkyl and C_5-C_{13} heterocyclylalkenyl;

n is 0 or an integer selected from 1 to 5;

 represents  ,  or  ; and

wherein each alkyl, alkenyl, alkynyl, cycloalkyl, cyclolkenyl, aryl and heterocyclyl group is optionally substituted;

wherein the article or material is coated or impregnated with the at least one compound of formula (I) or composition containing the at least one compound of formula (I).